

NOTES ON THE GENUS RHUS.

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The paper that I have prepared for your consideration deals with a class of plants, which, whether considered with reference to their beneficent or toxic effects on the human race, should be much more familiar to the general public than they now are,—I refer to the various species of *Rhus*.

The most noteworthy example of this genus in our own country, and the one to which the greater part of my remarks will apply, is commonly called Poison-Ivy. When we consider how common this plant is, and the number of persons liable to exposure to its noxious influence—the laborer engaged in railway work and in clearing bush land, the farmer working about his fences, one of its favorite habitations, and the child so often employed in berry-picking or in gathering the wild flowers with which our woods and meadows abound—I cannot impress on you too strongly the necessity for a thorough knowledge of the various species, their appearance and that of the plants with which they are most likely to be confounded, their poisonous effects and the prevention and cure of these. Some of the varieties being used for domestic purposes, others as medicines, I will also call your attention to their uses in the arts and sciences.

The only representative of the large order, *Anacardiaceæ*, the Cashew family, in northern North America, is this genus *Rhus*, a name derived from the Greek verb *reo*, "to flow," so called because it was thought to be useful in stopping hemorrhages. Truth to tell, the name was not inaptly applied by our forefathers, all the varieties being possessed of more or less astringent properties, some of them in a very marked degree. The genus, to the non-botanical commonly known as Sumach or Shumach, is composed of trees or shrubs having a resinous or milky acrid juice; alternate leaves; small, regular, greenish-white or yellowish flowers; and a fruit forming a sort of dry drupe.

Not less than fourteen varieties of *Rhus* are or have been used

in the arts and sciences (the term including medicine), and these I shall, for convenience of description, divide into two classes, native and foreign, dismissing the latter with but a brief mention of their uses.

Of the foreign species there are six.

Rhus Cotinus, sometimes cultivated in our gardens for ornament, under the names "smoke-plant," "purple fringe-tree," and, from the curious appearance of its seed-vessels, which look like a powdered wig, "periwig-tree," is known in commerce as Venice sumach. It is a small tree with purplish-green flowers, supported on hairy peduncles, and is a native of Siberia, Austria and Northern Italy. It is not used in pharmacy, but yields one variety of a wood known in trade as *fustic*, which has been largely employed for producing a yellow dye. A noticeable peculiarity about this species of *Rhus* is that its leaves are simple, like those of the elm and maple, not compound like those of the horse-chestnut and ash, as is the case with the rest of the genus.

Rhus Coriaria.—Of this both the leaves and the berries have been used as astringents and tonics, and the ground twigs as a dye-stuff. It is a native of the Ukraine, in Russia, and has been regarded by the inhabitants, when combined with a decoction of *Genista Tinctoria* leaves, as a preventive of hydrophobia. It is employed both internally and locally, and the peasantry have great faith in its curative powers, but extended trials in other parts of Europe have shown it to be useless in this much dreaded affection.

Rhus Succedanea is indigenous in Japan. From its berries is expressed a wax sometimes used in pharmacy known as Japan wax. It is of medium quality, ranking between beeswax and the ordinary vegetable tallow.

Rhus Vernicifera, varnish or Japan sumach, inhabits India and Japan, where it is highly prized for its yielding, from incisions made in the stem, a gum from which is made one of the best of varnishes.

Rhus Metopium is found in the West Indies, chiefly Jamaica, and is said to be one of the sources of "hog-gum," extensively used by book-binders in the process of marbling paper. This peculiar, and certainly not euphonious, name is derived from the fact that hogs, when wounded, are reputed to rub themselves against this tree so as to cover the wound with its juice and form a protection against the irritation of insects.

Rhus Semi-alata, a native of China and Japan, yields a gall largely used, especially by the Chinese, in dyeing their famous yellow silks. It is also highly esteemed by them as an astringent medicine.

Of the native species of *Rhus* I shall speak of eight, and, not to afflict you with their scientific distinctions, I will classify them as poisonous and non-poisonous, confining my botanical descriptions chiefly to the poisonous class, it being most important, to be able clearly to distinguish these from certain non-poisonous plants resembling them. The eight species are equally divided, four being innocent and four highly noxious. And first let me call attention to the non-poisonous varieties, meaning by this non-poisonous by contact with the plant, for, if given internally in large doses, even the innoxious ones act as irritants.

Rhus Aromatica, fragrant sumach—is a straggling bush with tri-foliolate, hairy leaves. The pale-yellow flowers, in clustered spikes like catkins, precede the leaves, which are sweet-scented when crushed. It extends from Lake Superior westward and southward, in dry, rocky soil, a variety, the *Rhus Trilobata* of Nuttall, chiefly affecting the Rocky Mountains and Sierra Nevadas. This plant, a few years ago, had a high reputation among some authorities as an astringent in enuresis, the diarrhoea of children, and the night sweats of consumption, but it has now fallen into disuse to a very great extent.

Rhus Glabra, variously known as sleek, smooth, Pennsylvania and upland sumach is found over the greater part of North America, south of the Arctic Circle. It is a short two to twelve feet high, with straggling branches, covered with smooth, light gray or somewhat reddish bark. The compound leaves, consisting of eleven to thirty-one leaflets, whitened beneath, in autumn change to a beautiful red. Growing along fences, borders of woods, and in rocky fields, its flowers open about July, and the fruit, often eaten by the country people, ripens in early fall. Excrescences produced on the under side of the leaves have been used as a substitute for the officinal galls obtained from the oak, *Quercus Infectoria*. Like galls, these excrescences are due to puncture of the young shoots by a hymenopterous insect to deposit its eggs. This irritates the part and a tumor arises, the result of morbid growth. The eggs enlarge with this growth and are converted into larvae, which feed on the

vegetable matter. Finally the larvae become flies and escape by eating their way out. For use, these excrescences should be collected when of full size, just before the eggs are hatched. All parts of this plant contain a large amount of gallo-tannic acid, and the bark is often used in tanning. The berries have a sour, astringent taste and owe their acidity to malic acid, which, however, according to Mr. Cossens, is not contained in the berries themselves but in the pubescence which covers them. An infusion of the fruit has been used as a refrigerant drink in fevers and as an astringent gargle in ulcerated sore throat.

Rhus Copallina, dwarf sumach, mountain sumach, or the Gum Copal tree, is a shrub with running roots, one to seven feet high, inhabiting rocky hills. The only known station for it in Canada is the Thousand Islands. Its branches are downy, and the petioles between the leaflets are wing-margined. Gum Copal so largely used in making varnishes, is the product of a number of different trees, one of which, according to some authorities, is the *Rhus Copallina*. The plant possesses similar, but less strongly marked, medicinal properties to *Rhus Glabra*, already described, and may be used as a substitute therefor.

Rhus Typhina, staghorn sumach, grows very commonly throughout Canada, from Nova Scotia to Lake Superior, along railway tracks and on sterile hillsides. It forms a tree ten to thirty feet high, with orange colored wood. The branches and stalks are densely velvety-hairy, with serrate leaflets pale beneath. This, the fourth and last of the innoxious species to be described, also possesses properties similar to *Rhus Glabra*, and may be substituted when that plant cannot be got.

Of the four indigenous species which have poisonous properties, one is an inhabitant of the Southern States, and a second of California, while the third and fourth are common in all parts of North America between the 35th and 60th parallels. Since their poisonous, and probably their therapeutic, effects are similar, I will first give a short description of each species and devote the remainder of my remarks to the physiological and therapeutic actions of *Rhus Toxicodendron*, the common form of poison ivy in Canada.

Rhus Pumilum, growing only in the Southern States, and very common in North Carolina, is a pubescent shrub, about a foot high, said to be the most poisonous of the eastern varieties. The pinnate

leaves, consisting of about eleven oblong, coarsely-toothed leaflets, are downy beneath. The three upper leaflets are often confluent, the terminal one, when distinct, being alternate at the base. The flower panicles are nearly sessile, with the drupes are covered with a red, silky pubescence.

Rhus Diversiloba of Torrey and Gray, or *Rhus Lobata* of Hooker, approaches very nearly to *Rhus Toxicodendron*. It is generally a shrub, but sometimes a climber, and is said to be the most poisonous of all the Rhuses. It is chiefly a native of California where it is known by the Spanish name of "Hiedra," but is said by Douglas to occur on the north-west coast. Its leaves consist of three, rarely five, obtuse lobed leaflets; its flower panicles are shorter than the petioles; and its fruit is white and pubescent. With her usual generosity, nature, according to Dr. Canfield, provides an antidote to poisoning by this species in the shape of another Californian plant, the *Grindelia hirsutula*, of which either the bruised plant itself, or a decoction, is applied to the parts.

Rhus Venenata, formerly called *Rhus Vernix*, is known by the different names of poison dogwood, poison elder, poison ash, poison sumach, swamp sumach, white sumach, and varnish tree. Affecting rich, swampy ground, in shaded situations, it is a shrub or small tree usually growing from six to eighteen feet high, and is one of the largest of our native species of *Rhus*. The trunk seldom exceeds three inches in diameter, and, branching at a height of three to five feet, usually makes a repeatedly two-forked ramification, the final twigs terminating in thick clusters of leaves. The smooth bark is dark gray on the trunk, lighter on the branches, and reddish on the twigs and petioles. The leaves, expanding in May, are at first dark yellow in color, but become deep green with a paler under surface when mature, and finally, at the first touch of frost, assume a beautiful deep crimson hue that can fairly vie with the maple for brilliancy of effect. The seven to thirteen leaflets forming the compound leaves are obovate-oblong in shape and entire. The small yellowish flowers are arranged in loose and slender axillary panicles, forming large masses of fragrant bloom at the ends of the branches, which attract innumerable swarms of bees. Whether the honey derived from this source possesses any poisonous properties I am unable to say, but, as at various times there have been reports of poisoning by honey in particular localities, it would be a point well worthy of in-

vestigation whether this form of poison-ivy does not also abound there. The berries, ripe in October, are whitish or dun-colored, with striate stones, and look somewhat like bunches of small grapes—a similarity, however, which need give rise to no error, as a glance at the leaves shows them to be *compound*, whereas in the grape they are *simple*. Taken altogether, this *Rhus* is one of the handsomest shrubs imaginable when in bloom, but is unfortunately one of the most dangerous. *Rhus Venenata* has been thought to be identical with the *Rhus Vernicifera* of Japan, and when incisions are made into its bark there is a copious flow of viscid fluid, yellowish at first, but soon changing to a deep black, which, when boiled, makes a fine varnish. The poisonous properties of this tree are said to be more powerful than those of *Rhus Toxicodendron*, persons exposed to its influence being more apt to suffer, and more severely. I have known several cases of poisoning due to this plant being mistaken for the common elder, an error which could never arise were the fact borne in mind that both varieties of elder, found in this country, have the margins of the leaves toothed, whereas in *Rhus Venenata* they are entire. In addition, the elders have dense masses of flowers, and a fruit which, when ripe, is either red or black, while the form of poison-ivy has slender, scattered bunches of flowers, and a fruit whitish in color when mature. *Rhus Venenata* is not very common in Canada, but is occasionally found in the western part of Ontario. The recorded localities are Weston, Port Colborne, Niagara Falls, Hatchley and London, Ont.

Rhus Toxicodendron may be made to include *Rhus radicans*, as botanists are now pretty well agreed that it is but a variety of the former, its differing form and characters, viz., more entire leaflets and high climbing stem, being dependent on the circumstances of its *habitat*. *Rhus Toxicodendron* was first described in 1635 by Cornutus in his work on Canadian plants, as a species of ivy. The Indians were well aware of its properties, and its effects were mentioned by Kalur and other travellers in North America. Poison oak, poison ivy, poison vine, poison creeper, and sometimes poison mercury, are names applied to it. It is very common throughout Canada from Nova Scotia to the Saskatchewan at Fort Edmonton, and is also recorded as occurring in woods near Yale, British Columbia. It is commonest in fertile and low grounds, but will thrive in barren and elevated places, and attaches itself to any bodies in its

vicinity by numerous thread-like rootlets given off from the stem. Sometimes it climbs spirally to the tops of our tallest trees, attaining a height of forty or fifty feet, again it is met with along the sides of fences which serve as a convenient support, or crawling over bush or rocks, along the ground, in which cases it never exceeds from one to three feet in height. This low form sends off many small branches, the pendulous extremities of which often give the plant a bushy appearance. The stems are from a quarter of an inch to two inches in thickness, and covered with a grayish-brown bark. The leaves, which are said to be eaten by cattle with impunity, are trifoliate; the leaflets being rhombic-ovate, pointed, pubescent beneath, and variously notched, of a shining red when they first appear in spring, but bright green at maturity. The flowers are small, greenish-white in color, and disposed in simple axillary racemes. The fruit is a round, dry berry, about as large as a pea, of a pale green color, and ripe in October. As in *Rhus Venenata*, from the bark when wounded exudes an acrid, milky juice, which exposed to the air for a few hours changes to an intense black, which will leave indelible stains on linen or cotton, not effaceable by any known chemical, and which has been used as a marking ink. The researches of Professor Maisch have proved that the acidity of the juice of *Rhus Toxicodendron* is due to the presence of a hitherto unknown volatile acid, analagous to, but distinct from, formic and acetic. Toxicodendric acid, when isolated, is found to affect the skin, either by direct contact or by its vapour, exactly as the fresh plant itself does, proving beyond doubt that the poisonous properties of the plant are due to it. This principle is in a great measure dissipated in the process of drying, and hence dried preparations of the plant are much less apt to act noxiously, though even these should be handled with great care by such as are susceptible to poisoning by it. The plants for which *Rhus Toxicodendron* is most often mistaken are the Virginia Creeper or American Ivy (*Ampelopsis quinquefolia*) with which the climbing variety often entwines itself, and the *aralias nudicaulis* and *quinquefolia*, commonly known as Wild Sarsaparilla and Ginseng, often found growing with the low form. These plants are very easily distinguished if one will take the trouble to remember a single simple distinctive mark, viz., that they have *five* leaflets on a single leaf-stalk, whereas the poison ivy has only *three*. Other distinguishing marks are that the *aralias* have

regularly serrate leaves and in nudicaulis the flower-stem is separate from the leaf-bearing one.

The toxical effects of the poisonous species of *Rhus* are produced in various ways and degrees of severity, but in all cases they are due to absorption by the system of toxicodendric acid. They may be the result of direct contact with any part of the plant or its juice; of exposure to smoke from the burning of it; of inhaling the steam arising when making pharmaceutical preparations of it; of internal use; and of emanations from the growing plant. The most specially noteworthy of these methods of poisoning is that by exhalations from the living plant itself. According to Cazin, such exhalations are only given off when the plant is not exposed to the sun's rays (as when it grows in the shade and at night) and consist of hydrocarburetted gas mixed with toxicodendric acid in a volatile state. That they will cause poisoning in those exposed to their influence, without actual contact with the plant, and even at considerable distances, is doubted by many scientists, but there is considerable weight of evidence pointing that such is really the case. Wyville Thompson, of the late *Challenge* exploring expedition, states that among the blacks of the West Indies there is a *superstition* that some species of *Rhus* will poison without actual contact. Aboriginal traditions are rarely found to exist without some foundation, and in this case so strong a one that it should have prevented the report being called a superstition without fuller investigation. I could cite a number of instances of poisoning, both recorded and coming under my own notice, where all the evidence goes to show that there was no possibility of contact with the plant. "A lady of known susceptibility was attacked after being out driving, though she had never left the vehicle, which kept the centre of the road. Here the nearest distance of possible exposure would be that of plants growing, where they were afterwards discovered, along the fence, a distance of over twenty feet." Again, a medical friend of my own experienced a severe attack after passing, at a distance of at least three feet, a thicket in which grew a mass of the plant; while a gentleman so noted in the scientific world as to vouch for the accuracy of his powers of observation, while engaged in geological researches, found to his cost the effect of passing some, though he had previously noted it, and was hence most scrupulous not to let it touch him. It seems to me, too, that the knowledge of this method of poisoning

by Rhus is peculiarly interesting as offering a plausible solution of what are generally regarded as fabulous stories of the deadly effects of the upas tree of Java, under which the wearied traveller laying himself down sinks into that sleep which knows no waking. Is it not at least within the bounds of possibility there may be a Javanese tree possessing similar, perhaps stronger, noxious properties to Rhus Toxicodendron, and thus capable of poisoning its surrounding atmosphere?

The poisonous effects of Rhus are both local and constitutional, according to the idiosyncrasy of persons; acting upon some only locally, upon others only constitutionally, and upon yet another, and the most frequently met class, in both these ways. A certain constitutional predisposition is requisite for the occurrence of poisonous symptoms, many individuals being quite insusceptible. I myself am a case in point, having often rubbed both Rhus Venenata and Rhus Toxicodendron, as well as their juices, over my hands and face without suffering the slightest inconvenience therefrom. To illustrate the peculiar virulence of this plant toward some constitutions, I might state that the celebrated chemist Fontana, knowing himself to be easily poisoned by it, and wishing to examine into its properties, caused specimens to be got ready by another person, but accidentally touching one of the leaves, under some water into which it had dropped, in a short time began to suffer from its poisonous effects. This susceptibility varies greatly under certain conditions of animal and atmospheric temperature. In some persons a difference is observable whether in a warm or cold climate, and some suffer only on very hot days. With others climate and season seem to make very little difference. Children are much more liable to be poisoned than adults, and females than males. When the skin is moist the poison is more readily absorbed. A gentleman who had often handled the plant with the greatest impunity, experienced his first attack through rubbing against some of it while his skin was still undried after bathing, and though he has several times since rubbed the plant over the dry skin, has suffered no ill-effect. For this reason also, persons perspiring, especially if fatigued, are more liable to be affected.

Instances are related in which a periodical return of the symptoms of poisoning, without fresh exposure, has occurred for a number of years. This is doubted by some, who ascribe the

succeeding attacks to fresh exposures to the plant's emanations, without the patient's knowledge. An able advocate of this view thus expresses himself in regard to the poisonous emanation : " Being volatile, it may be readily diffused, and like malaria or the cause of hay-asthma, may act under favorable circumstances, as of aerial currents and susceptibility in the recipient, at a considerable distance from its source. Now it is well known that no protection is conferred by a prior attack, and hence it might reasonably happen, that a person having suffered from ivy poison one season, would also suffer the next by reason of susceptibility, even though scrupulous precautions should be taken to avoid direct exposure. In such a case the diffused emanations might be sufficient as an exciting cause to account for the recurring attack. It is to be noted that the so-called recurring cases always take place during the summer season, and at the period of the plant's poisonous activity, but never in the winter, which lends support to the supposition of the existing cause being diffused in the atmosphere." These plausible arguments do not however, to my mind, clear up all the reported cases of recurrence. A gentleman was poisoned one year in this country, and the next he went to Europe, where, at the same season of the year as that when he was first poisoned, most of the symptoms returned. Now, being in Europe, he could not be exposed to the noxious emanations of poison ivy, and the opponents of the recurrent theory would have to fall back on the far-fetched argument that he might have been exposed to noxious effects, resembling those of poison ivy, from some poisonous shrub of Europe. Further, in some cases the eruption is said to have returned annually for several years, and one can hardly imagine a person suffering a number of consecutive attacks without noting his fresh exposure in at least some of them.

In the New York "World" last year there appeared in an article, by one Edmund Collins, on the poisonous rhuses, the following extraordinary statement : " Every one does not know what is the meaning of the term 'poison-ivy.' They do not know that a little while after touching the leaves or branches of a poisonous tree or ivy, a vivid red rash appears upon the hand, wrist or leg, and then spreads over the whole body. A microscopist removes a little of the rash, puts it on the slide of the microscope, and, under a glass with a magnifying power of 300 diameters, sees an active little para-

site. This parasite lives in millions on the 'poisonous' tree or plant, but when the leaf or stalk where they cluster is touched by one's hand or wrist, a score or more of them may be found clinging to the skin. They cannot be seen with the naked eye, but they may be removed by the edge of a sharp instrument and put on the slide of a microscope. They are rather oval in shape, and have a wonderful power of reproduction. Suppose a child touches a leaf or stem with his hand or wrist, five or six of these parasites get upon the skin, huddling close together, and remaining in the same spot for hours. The child doesn't feel them and can't see them, but the pests at once begin to burrow under the skin, feeding and building nests. In a short space of time they have increased a thousandfold, after which they all move about, making little settlements all over the body, turning the skin rough and red, and producing a torment of itching. These parasites are communicated even by shaking hands, though the bacillus (which it really is) will not burrow so readily in the skin of an adult as in the softer skin of a child. I have known about eighty per cent. of a school, consisting of nearly sixty pupils, to be contaminated by one small boy who had the rash of poison ivy on his wrist. He was the only one in the school who had been in the woods, and he had brushed through a clump of poison ivy. It was the belief down to a very late period that the poison from these plants was an acid or sharp juice, which, getting upon the skin, irritated the part and set up an inflammation. The modern microscopists know it is a parasite which can live on the petals or stems of the plants named, or on human blood, and thrives best on the latter. The two poison sumachs are provided with a thick, viscid juice, which exudes when a branch, stem or leaf is crushed or broken. In this matter are myriads of the parasites, but, as already stated, they are communicated to the skin by the brief contact of any exposed portion of the hands, arms, face, or any other part of the body."

On reading this strange statement I at once communicated with Dr. Van Harlingen, of Philadelphia, one of our best authorities on skin diseases, who told me, as I had surmised he would, that the statement was a mere newspaper "yarn," which advanced an utterly untenable statement, and one of which he had never even heard.

The symptoms of rhus poisoning are violent itching, redness, burning, and erysipelatous swelling of the parts subjected to its in-

fluence. The face and hands are most apt to be affected, in some cases the swelling being so great as to obliterate the features, but any part of the body may present similar appearances. Of poisoning by its internal use there are five cases on record. In one instance two children, aged respectively six and eight years, ate the berries ; and in the other, three persons, a boy aged twelve and two girls aged fifteen and seventeen, took an infusion of the root in mistake for one of sassafras. In a few hours there was drowsiness and stupor, followed by vomiting, convulsions and delirium, and in some of the cases there was an eruption over the body. All these persons recovered after varying intervals.

The prevention of poisoning by the rhuses should be strongly impressed on the community at large. Everyone should know the distinctions, which I have already given, between the various species and the plants with which they are most liable to be confounded. Being worthless and of little value except medicinally, and even then probably much overrated, they should be extirpated by every thrifty farmer. A strong alkaline solution, used immediately after exposure, will often prevent the poisonous effects of rhus on those known to be susceptible to its influence, while anyone obliged to work near poison ivy should smear his face and hands freely with sweet oil or grease, when no ill effects are likely to follow.